UNITED STATES DEPARTMENT OF AGRICULTURE

MISCELLANEOUS CIRCULAR NO. 31

WASHINGTON, D. C. JANUARY, 1925

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FOREWORD

Somewhat over a year ago the editor of one of the larger of the country papers of California wrote: "If you or some one else in the Forest Service would only write up simple descriptions of our California trees, in such language that the plain man could understand them, I believe every country paper—and some city ones—would be glad to print them."

That recalls an incident of years ago. As a train waited on a siding in the Coast Range two boys who were gazing delightedly out upon giant Redwoods asked their father: "Dad, what kind of trees are they?"

The father glanced up from his newspaper and said: "Pines, I guess."

So the lads called them Pines until a brakeman, hearing them, grunted: "Them's Redwoods."

Misinformation is even worse than ignorance. It is hoped that our traveling friends who visit California, as well as the residents throughout the State, will find this booklet helpful in giving them reliable information about some of California's principal trees.

Washington, D. C. Issued January, 1925

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LET'S KNOW SOME TREES

Brief Descriptions of the Principal California Trees

CONTENTS

THE PINES

First of the cone-bearers, we name the tree John Muir so loved—the **Sugar Pine,** finest of all the pines in the world. It often grows to be 200 feet high, with a trunk from 4 to 8 feet through. The bark is reddish brown in color; the leaves (needles) are dark green, five in a bundle, and about 3½ inches long. The beautiful cones are from 12 to 20 inches long, clear light brown when dry, and hang in bunches from the tips of the branches. Sugar Pine is found from southern Oregon to Lower California. In the Sierra Nevada Mountains of California it reaches its best development from 5,000 to 6,000 feet above the sea.

The **Western Yellow Pine** is found in all the States west of the Great Plains, and also in British Columbia and northern Mexico. In the Sierras it grows often with the Sugar Pine, from which it is easily distinguished by its longer needles (4 to 11 inches) occurring in bunches of three. The cones are only 3 or 4 inches long as a rule, reddish-brown when dry, and set in a mass of needles at the ends of the branches. The bark on old trees forms large, irregular, yellowish plates.

A species closely related to the Western Yellow Pine is called **Jeffrey Pine.** It is a somewhat smaller tree, although its cones are much larger. Its reddish, occasionally almost black bark, is broken into narrow plates. The needles occur, like those of the Western Yellow Pine, in bunches of three. Although occasionally found by itself—in what is called a "pure stand"—it is usually associated with the Western Yellow Pine and the firs.

The **Coulter Pine** (fig. 1), often called the Bigcone, is common in the mountains of southern and Lower California. Its leaves (needles) are also three in a cluster and average 9 inches in length, but are stiffer and heavier than those of the Western Yellow Pine, as are also the branches and twigs. But the great distinguishing feature is the cone, which is 9 to 14 inches long, very thick and heavy, and armed with sharp hooks.

The **Digger Pine** is found in the dry, hot foothills. The bark is a dull gray-brown, and the leaves, in sets of three, are 8 to 12 inches long, gray-green in color, and sparse. You can fairly see through a Digger Pine, while a Western Yellow Pine almost obstructs the view. The cones of the Digger Pine lie close against the trunk or larger branches and often

stay on the tree for years. While not so heavy as those of the Coulter Pine, the cones are of the same type and are much heavier and harder to handle than those of the Western Yellow or the Jeffrey Pine or those of the Sugar Pine, which, though long, are light and without barbs.

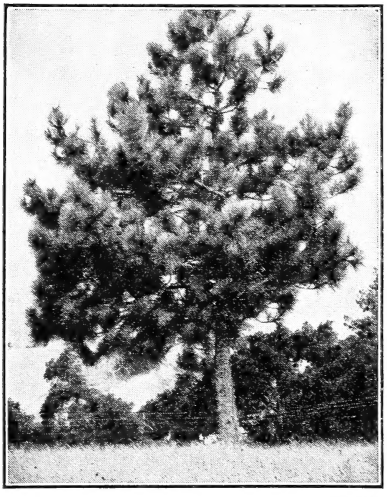

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FIG. 1.—COULTER PINE (PINUS COULTERI)

The **Monterey Pine** (fig. 2), often 90 to 100 feet in height in sheltered locations, is only 60 to 80 feet high near the coast, and is a distorted, flat-topped dwarf on the rocky points. The needles are 3 to 4 inches long, in bunches of three, the bark is dark and ridgy, and the closed cones hang for years on the tree. This tree is easily transplanted and grows readily from seed, and hence is used to hold drifting sands. Although of no timber value in California at present, it has been largely planted in Australia for box lumber.

The Indians often break the nuts and eat the seed of the Digger Pine of the foothills, and they prize the nuts of the Sugar Pine that "float" out of the opening cones from high up on the trees and are hard to locate when they reach the ground. But it is the seed of the **Single-leaf Pine** of dry desert slopes, mainly on the east side of the Sierras, that are sold in fruit stores as "piñon nuts." These are gathered in quantity by piling the cones when they are mature but still closed in great stacks and opening them by a slow fire. The tree is only 15 to 20 feet high, and has dark brown bark and light green needles. This is the only American pine whose needles grow singly, not in bundles. These needles are plentiful, however, and the low trees or bushes are thickset and solid.

Another food pine, the **Parry Pine,** a species whose needles grow in bundles of four, is merely a large bush of the desert slopes in southern and Lower California. The bark is reddish-brown, the nuts very good to eat, but the tree is too scarce to count for much.

A desert pine, the **Bristlecone,** is an irregular, bushy tree with a short, thick trunk. Its needles are usually

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FIG. 2.—MONTEREY PINE (PINUS RADIATA)

in fives. The cones, about 3 inches long and dark reddish-brown when ripe, have scales tipped with sharp, thin bristles.

A rather rare species is the **Limber Pine,** found only at high elevations. The bark of the young branches is very light while that of the main stem

is dark brown. The needles, in bundles of five, grow in close masses and are from 1½ to 3 inches long on the flexible, trailing branches. The green twigs are so limber that they can almost be tied into knots without breaking. These trees may be found on Mono Pass. The cones, fom 4 to 10

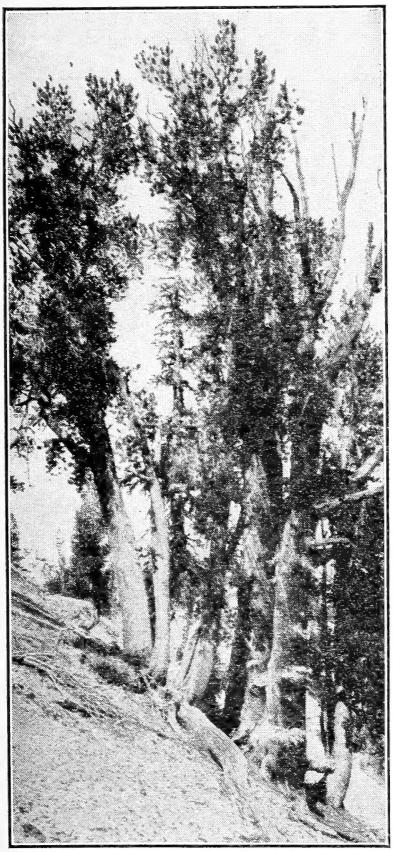

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FIG. 3.—WHITE-BARK PINE (PINUS ALBICAULIS)

inches long, take two years to mature—as is the case with most pines—and by early winter of their second year have fallen from the tree.

The **Foxtail Pine,** or Balfour Pine, grows at or near timber line, occurring in small, isolated groups, mainly in the Sierras. The needles occur in bundles of five and are massed in "foxtails" near the ends of the branches.

A very beautiful tree is the **Western White Pine,** sometimes called "Silver Pine," "Mountain White Pine," or "Little Sugar Pine," which grows above the true Sugar Pine belt. Its cinnamon-red bark is only about an inch thick; its needles, in bundles of five, are shorter than those of the Sugar Pine and its cones are like miniature Sugar Pine cones.

The so-called "Tamarack" of the California mountains, properly named **Lodgepole Pine,** sometimes forms rather large forests, as it once did on the mountain ridges between Lakes Tahoe and Carson, but most often straggles along the edges of mountain meadows. The needles are in twos; the bark is gray or brownish, somewhat soft, and full of resin. Woe to the thoughtless boy who cuts his initials in that temptingly soft bark. In a short time the incision is dripping pitch, which will get on his hands and clothes, on those of his fellow campers, and of anyone who follows his party for months. The cones are seldom over 2 inches long. The tree is at its best from 6,000 to 8,000 feet above sea level.

The bushy little alpine pine known as **White-Bark Pine** (fig. 3) or "Dwarf Pine," which interests all who cross the high Sierra passes, has thin, silvery bark, leaves in clusters of five, and cones a deep purple when growing on the tree, brown when dry, and from 1½ to 3 inches long. While the trees are truly dwarfed into shapeless shrubs on the highest elevations where

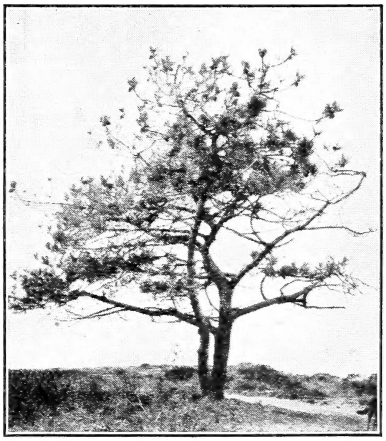

FIG. 4.—TORREY PINE (PINUS TORREYANA)

they occur, in more sheltered spots of deep, rich soil they have been found 50 feet high and almost 2 feet in diameter.

The **Knobcone Pine** or "Scrub Pine," is a small tree 20 to 40 feet in height, and seldom as much as 18 inches through. In slightly different

forms, it occurs in both the Coast Range and the Sierras. The needles are in threes and are light green; the cones, in clusters around the stem, remain indefinitely on the tree with the prickly scales closed.

The **Torrey Pine** (fig. 4), found near the sea only in San Diego County and on Santa Rosa Island, is the rarest of California pines. Bent by sea winds, it is a crooked, sprawling tree 20 to 30 feet in height, and from 8 to 14 inches through. Occasionally, away from the sea winds and in protected hill coves, it has a straight trunk from 50 to 60 feet in height. The stout, gray-green needles, in clusters of five, are from 7 to 12 inches or more in length; while the russet or chocolate brown, strongly attached cones, about the size of a coconut, bear large edible seeds.

The elevations at which the various pines grow are about as follows:

Bristlecone	7,000 to 11,000 feet
Coulter	2,500 to 6,000 feet
Digger	1,000 to 3,000 feet
Foxtail	5,000 to 11,500 feet
Jeffrey	6,000 to 8,000 feet
Knobcone	1,500 to 3,000 feet
Limber	8,000 to 12,000 feet
Lodgepole	4,000 to 11,000 feet
Monterey	At or within a few hundred feet of sea level.
Parry	4,000 to 8,000 feet
Single-leaf	2,500 to 9,000 feet
Sugar	4,000 to 7,000 feet
Torrey	Sea level to about 100 feet
Western White	5,500 to 9,000 feet
Western Yellow	2,500 to 7,000 feet
White-bark	7,000 to 11,000 feet

FIRS, CEDARS, AND SEQUOIAS

The **White Fir** (fig. 5), mainly of the western slopes of the Sierras and the Cascades, is a beautiful tree, often 200 feet high and 4 to 5 feet in diameter. The old bark is dark ashy gray, and the leaves are 1 or 2 inches long, in flat rows, and fragrant. The cones, standing upright on the upper branches, are 3 or 4 inches long and fall to pieces when they are mature, while still on the tree. The branches of young White Fir grow in whorls, and the bark is grayish with a brownish tinge. Young White Fir is one of the most desirable Christmas trees.

The **Red Fir** resembles the White Fir but occurs at higher elevations. Its furrowed bark, in zigzag ridges, is dark red or purplish. The mature leaves are deep green, while the new foliage is silvery. The upright cones are 5 or 6 inches high and, like those of the White Fir, fall to pieces on the tree when ripe. The 4-angled leaves are longer and flatter on the lower branches, but shorter, closer set, and more silvery on the young high branches.

The **Bristlecone Fir** is one of the rarest of California's true firs. Scattered patches of it grow mainly in Monterey County at the heads of canyons on the seaward slopes of the Santa Lucia Mountains. The sharply pointed, spirelike crowns are so distinctive that the tree can be recognized among its associates several

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FIG. 5.—WHITE FIR (ABIES CONCOLOR)

miles away. So also its long, flat, keenly pointed, lustrous leaves and its egg-shaped cones bristling with slender needlelike bracts are ready means of distinguishing this beautiful fir.

The **Douglas Fir** (fig. 6), the most valuable timber tree of Washington and Oregon (the "Oregon Pine" of commerce), occurs in small groups or mingled with other species in the Cali-

fornia mountains, as does the closely allied Bigcone Spruce. The bark is thick, furrowed, and smoky brown, and is used to some extent in tanning. The leaves are flat and slightly grooved and are usually deep yellow-green, although in exposed dry areas (especially in the Rocky Mountains)

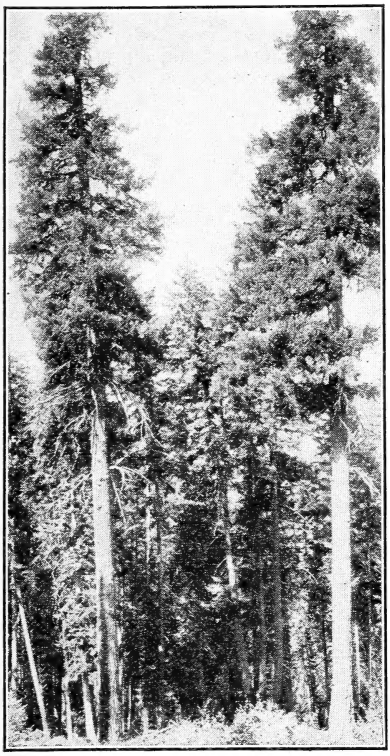

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FIG. 6.—DOUGLAS FIR (PSEUDOTSUGA TAXIFOLIA)

they are often bluish. All of the branches have long, drooping branchlets. The cones, 2 to 2½ inches long, have prominent, projecting, 3-pointed bracts, which are of great assistance in identification.

Incense Cedar is the beautiful and fragrant-foliaged tree so common in both the Coast Range and Sierras. The cinnamon-brown bark can be pulled off in long strips and has even been used for roofing cabins. The leaves lie in flat fernlike sprays. The tiny cones hold four little seeds apiece, two on each side of the flat central partition. The timber is very durable when it can be found free of the dry rot, which is its greatest disease enemy.

The **Western Red Cedar** is found in the foggy northwest coast valleys. Its foliage is very much like that of the true cypresses, and its wood is resistant to decay, making it valuable for posts.

The **Bigtree** (fig. 7), or **Sequoia**, of the Sierras, that lives 2,500 years or perhaps longer, attains heights of 200 to 280 feet, with trunk diameters of 12 to 20 feet—in rare cases even 30 feet or more. The soft, red bark is often 2 feet thick. The leaves are small, blue-green, awl-shaped, and grow in sprays. The beautiful cones seem absurdly small for those great

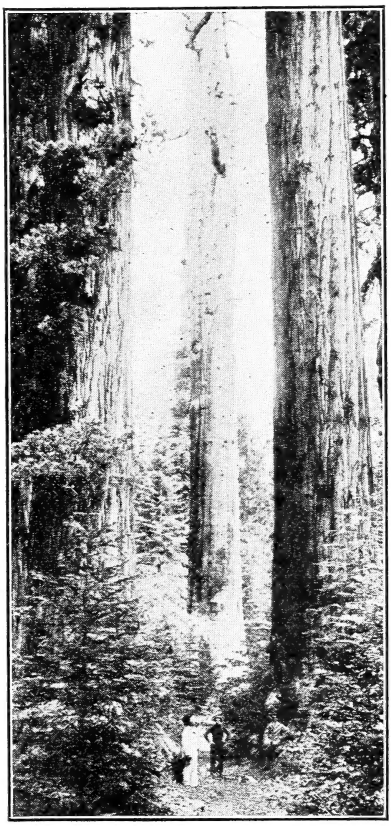

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FIG. 7.—BIGTREE (SEQUOIA WASHINGTONIANA)

columnar trunks to bring forth, and are only about 2 inches long, while the tiny seed itself is thin and flat.

Redwood (fig. 8), the Sequoia of the Coast Range, grows taller than the Bigtree but is less in trunk diameter, more tapering, and not so long-lived, the oldest ring count in-

dicating an age of about 1,400 years. The cones of this species are even smaller than those of the Bigtree, being an inch or less in length; the seed is very similar.

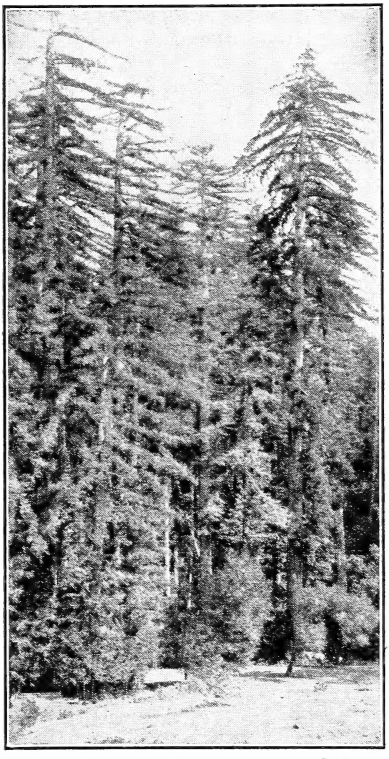

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FIG. 8.—REDWOOD (SEQUOIA SEMPERVIRENS)

OTHER CALIFORNIA CONE-BEARERS

A small and useful tree of the high ranges, the Western or **Sierra Juniper**, of which four different species occur, lives for hundreds of years and yields fragrant, cedarlike wood. Its small, blue-black berries are technically "cones"; the brown-red bark is soft and fibrous. The junipers are usually small bushy trees growing in high places and desert borders.

Other conifers occur in California in comparatively limited areas. There is the **Monterey Cypress** (fig. 9), for instance, with its gnarled and twisted, moss-hung grotesqueries; the **Gowen Cypress**, a finer foliaged but smaller tree which grows along the coast, in scattered locations from Mendocino County to San Diego; the **Pygmy Cypress**, found only on the coast barrens of Mendocino County; and the **McNab Cypress**, found in Shasta County and the Siskiyous and south to Napa County, in isolated groups. To most of us there is little difference between these cypresses except in size. The round cones in rows or groups along the branchlets mark them as cypresses, as does the foliage, with which we are all familiar in windbreaks and garden hedges.

The **Port Orford Cedar** (Lawson Cypress) is one of the most beautiful evergreen trees to be found in the State. In California it is confined almost entirely to Humboldt County, although it occurs occasionally as far inland as the west base of Mount Shasta. The tiny leaves of its peculiarly flat branchlets are soft to the touch as compared with the leaves of the true cypresses. The tree is from 125 to 180 feet high, 3½ to 6 feet through, and is an excellent timber tree, but occurs in such limited areas and in such small groups that it is not a large factor in the lumber business of the State.

Then there are the spruces: The glorious **Sitka Spruce** in low valleys

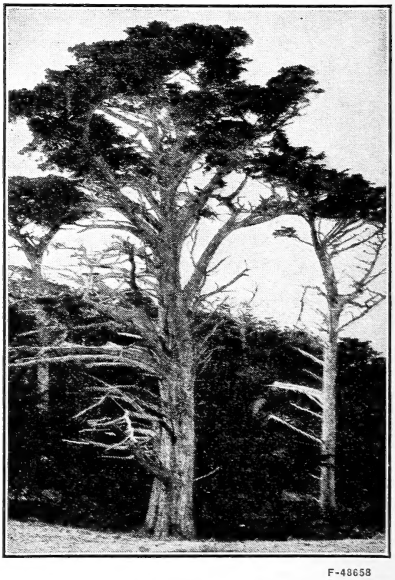

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FIG. 9.—MONTEREY CYPRESS (CUPRESSUS MACROCARPA)

facing the ocean, from the northwest borders of the State as far south as Mendocino, and the **Weeping Spruce** in about the same regions of moisture-laden air. These are both in a manner spilled over from Oregon, where they are at their best. We have the

so-called **Bigcone Spruce,** too, from eastern Santa Barbara County south to the limits of the State. This was long considered a variety of the Douglas Fir, which it much resembles except for its larger cones. This tree is of value only as "protective cover."

The rare **Mountain Hemlock,** when small, looks like the Deodar Cedar of the Himalayas, so often planted in parks. The leaves grow in close tufts, and the oval cones, 1 to 2 inches long, have an exquisite purple bloom when young.

Nor must we forget our **California "Nutmeg Tree,"** that strange tree with the flat, shining, sharply-pointed leaves whose keen aroma has won it the name of "stinking cedar." Its seed-kernel suggests in shape the nutmeg of commerce. The trunk, usually twisted or crooked, occasionally reaches a height of 80 feet, but is more often from 35 to 50 feet in height. The rather soft bark, with its finely-checked seams, is green on the younger branches, but becomes yellowish as it gets old. Though found both on the west slopes of the Sierras and in the Coast Range, from Lake County to Kern, it is in such small, scattered groups that it is not of commercial value.

Several books suitable for studying the cone bearers of California have been issued. Unfortunately, Willis L. Jepson's "Trees of California" and J. Smeaton Chase's "Cone-Bearing Trees of California" are both out of print. It is sometimes possible, however, to find them in a second-hand book shop; and they may, of course, be consulted in libraries. Especially useful for those not trained in botany is George B. Sudworth's "Forest Trees of the Pacific Slope" (441 pages), published by the Forest Service in 1908. This is fully illustrated and should be a part of the outfit of every automobile that goes into the mountains. It is on sale by the Superintendent of Documents, Government Printing Office, at Washington, D. C., at 60 cents a copy.

THE OAKS

The oaks of California are divided roughly into white and black, according to the color of their trunks; and each of these sections is again divided into live oaks and deciduous oaks. One species, the **Morehus Oak,** seems like a cross between the two last-mentioned groups, for it holds its leaves until the swelling buds of spring push them off, leaving the branches bare but a few weeks.

California oaks do not furnish good commercial lumber, although occasionally barrel staves, flooring, bridge planks, and even furniture have been manufactured from some of them. As a rule, all the varieties form poor, cross-grained, brittle wood, decaying at the heart before saw-timber size is reached. They have been used principally for firewood and one species (Tanbark Oak) for tanbark. But from valley floor up the mountains to 4,000 feet they give the beauty and shade that are dear to every camper. Beyond that elevation they still gleam bright green, or in the fall golden and scarlet, among the darker pines; or form thickets of "scrub" in openings.

The three most widely scattered and abundant of the deciduous oaks—the three attaining the largest size—are the Valley Oak, the Blue Oak, and the California Black Oak. A fourth, the Garry Oak, is abundant in California in the northern coast region.

The **Valley Oak** (fig. 10) is the tree of the interior plains and valleys, growing in open stands, in groves, or scattered over miles of level or gently sloping ground, from the headwaters of the Eel River to Los Angeles and Santa Monica. It is found up to 5,000 feet in the watersheds of the Sur and Carmel on the north and west slopes of Tamalpais, and up the first foothills of the Sierras, in some places as high as 3,000 feet. Occasionally a tree 100 feet high is seen, or one with a diameter of 30 to 40 inches—sometimes much more. As a rule, however, 40 to 50 feet is the height and 20 to 30 inches the diameter of a Valley Oak.

One of the finest specimens is the Sir Joseph Hooker Oak near Chico, 150 feet in spread of branches, and with a trunk 6½ feet in diameter. When the late General Bidwell took Sir Joseph Hooker to see this tree, the latter said he thought it was the largest and most beautiful oak he knew of anywhere in the world. Another splendid specimen, 130 feet high, is in the Ojai Valley, and the Henley Oak in Round Valley is 150 feet high and over 8 feet in diameter.

The incut leaves vary in size, but are of the sort from which the oak-leaf patterns used in carving, table linen, and embroideries are taken. It is one of the few trees that give us autumn color near San Francisco, and loads of the colored foliage are

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taken from the San Mateo peninsula to the San Francisco florist shops in the fall. The acorns are bright chestnut in color and slender, have close, scaly cups, and vary greatly in size. The trunk is ashen gray and is of the white-oak type.

The **Blue Oak,** appropriately so called because of the blue tone of its foliage, is another white-trunked tree. It occurs on the interior slopes of the Coast Range and the west slopes of the Sierras, in the same dry, sunny conditions that delight the Digger Pine. These trees once covered the foothills in open stands for many miles from Mendocino and the mountains south of Shasta clear to the Tehachapi. It is the oak that named

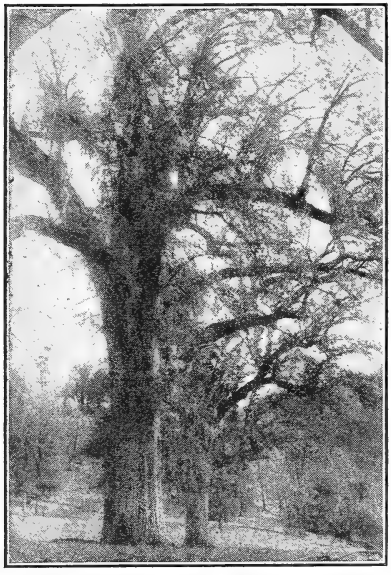

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FIG. 10.—VALLEY OAK (QUERCUS LOBATA)

Paso Robles and that occurs on the Carriso Plains. For years it furnished the firewood of Stockton, Modesto, Merced, Madera, Fresno, and Tulare, but the easily accessible supply has now disappeared. The leaves of this oak are "wavy" at the edges, but are not deeply incut like those of the Valley Oak, and the acorns are blunter and thicker in proportion to their length. The tree is seldom over 40 feet high and 20 inches in diameter, although rare specimens have been found with a diameter of 2 feet and a height of 75 feet.

Next in range of altitude, but overlapping the Valley and the Blue Oaks, comes the **California Black Oak.** The hard, deeply furrowed bark of this tree is very dark, seeming black when wet and bare. After the soft pink leaves of the spring mature into the great, shiny, dark yellow-green ones of summer, however, little of the trunk is visible beyond the first few feet above the ground. The leaves of this oak are similar in shape to those of the Valley Oak, but are longer (4 to 6 inches) and deeper green. The acorns vary in size, are pale chestnut in color, and downy at the top end. The cups are scaly, with the lowest scales much thickened. This oak occurs from central Oregon to the Mexican border, not on the plains or near the sea, but usually from 1,500 feet up to 5,000 or 7,000 feet, where it meets and mingles with the Western Yellow Pine and Firs. It is at its best in the Sierras at 3,000 feet, where it is the principal oak species, furnishing many Indians with what was once their main dependence for food, and is even yet a favorite item in their diet—acorn-meal mush. It also furnishes firewood for the mountain people and mast for their hogs. California Black Oak is the principal oak in the Yosemite Valley.

The White Oak of British Columbia and Washington, the largest and most abundant oak of Oregon and there called the Oregon Oak, is our **Garry Oak.** It is commonly 25 to 55 feet high in California and is abundant in the Bald Hills region, inside the redwood belt of Mendocino and Humboldt Counties. It is found rather frequently as far south as the east side of Santa Rosa Valley, and rarely in the Santa Cruz Mountains. The 5 to 7 lobed leaves are large and of a dark, shining green. The trunk bark is white and cut into broad plates by shallow fissures. The shiny acorns of the Garry Oak differ from the acorns of the other large oaks of California. They are almost round (one-fourth to 1¼ inches long by two-thirds to 1 inch thick) and bulge out of very shallow cups.

The evergreen or "live oaks" form a distinct class, in which three or four stand out conspicuously. This indefinite number is used because one of them, the **Tanbark Oak,** is not called an oak at all by some botanists, but is classed with the *Pasanias,* of which there are over a hundred species in southern Asia, though only this one grows in California. These *Pasanias* are as nearly related to the chestnut as to the oaks, have chestnutlike leaves and upright catkins like a

chestnut instead of the drooping flowers of the oaks. The fruit, however, is plainly an acorn, although the acorn cup is bristly and suggestive of a chestnut burr.

The Tanbark Oak is commercially the most useful of our California oaks. It is a smooth-trunked tree with light-green leaves, shiny on top as a rule but woolly on the underside. While it occurs in the Coast Ranges from southern Oregon to Lower California, it is commonest and best in Humboldt, Mendocino, Sonoma, Santa Cruz, and Monterey Counties, where the Redwood grows best. There it is cut for its bark, which is of great value to the leather industry. The wood is left on the ground to decay or is hauled off for firewood. Although it is the hardest and most beautiful of our oak woods, really suitable for furniture, it has not been so used except as an experiment.

The **California Live Oak**—the oak that named Oakland and is the glory of the Berkeley campus—is a low, broad tree, usually with a trunk 1 to 2 feet in diameter and a height of 50 feet, though occasionally trees 60 to 70 and even 80 feet in height and 3 feet through are found in favorable locations. The largest recorded specimen, over 100 feet high and more than 6 feet through, is in the Ojai Valley.

This oak occurs in the Coast Ranges from Sonoma County to Lower California. The leaves are similar to holly leaves and when mature curl over, partially hiding the under surface. The bark on young trees is light, but old trees have the dark, heavily ridged bark we all know. The acorns are not large, and the edges of their scaly cups turn in.

The **Interior Live Oak**, when young, is similar to the California Live Oak, except that its leaves do not have a tendency to curl. It is a vigorous, round-headed tree, 30 to 75 feet high, with a trunk 1 to 3 feet in diameter, and leaves either smooth-edged or spiny-toothed. One finds it on the trails climbing the sides of the Yosemite Valley, where it gives a good excuse for stopping for breath while one notes its slender acorns, sometimes more than half covered by the dark brown, scaly cups. At higher elevations this tree degenerates into very tough chaparral. It is found throughout the State, in the foothills and valleys, usually away from the coast.

The **Canyon Live Oak** is a glorious tree, with scaly, whitish bark. It is sometimes called the Maul Oak because it makes such superb mauls or mallets for use in driving the frow when making split shakes. At an elevation of 2,000 to 3,000 feet in the canyons of the Sierras it is abundant and attains a good growth, with a height of 60 feet and a girth of 9 to 12 feet; in less favorable places it is 20 to 30 feet high and 1 to 2 feet through; but in the bottom lands of valleys in Mendocino and Humboldt counties it is a noble tree, 80 to 95 feet high and from 4 to 6 feet in diameter. Large trees have an odd habit of forming buttresses at their bases, which sometimes grow out from the trunk with sufficient abruptness to form seats. The leaves vary greatly, being sometimes entire at the edge, sometimes toothed; but like the rest of the evergreen oaks they are never incised, as are the Valley, the California Black, and other deciduous oaks. The acorns are very unusual because of the yellow fuzz that covers the cups, hiding their scales and giving the oak still another common name—that of "Golden Cup Oak."

One of the most interesting and useful groups of trees is that which goes under the name of "Scrub Oaks." They are really not trees at all, but bushes from 4 to 12 feet high. They are great soil makers and soil holders, often growing in dense thickets on open, dry ridges, slowly breaking into the rock that lies so near the surface and holding the soil they make by the network of their roots. Over thousands of acres they are all that keep the winter rains from sluicing the surface soil off the rocks, thus filling up the artificial lakes with sand or breaking the dams with a sudden rush of water. One hears the uninformed man laugh at some of the southern California "forests," and ask if there is a tree in them. But it is the protection afforded by these very scrub oaks, so absurdly unforestlike in appearance, which is really responsible for some of Mother Nature's most effective forestry in California.

The principal species in the northern part of the State, from the Oregon border to the Kaweah Basin in Tulare County, is the **Brewer Oak**, a beautiful little thicket-forming shrub, sometimes a lovely round-headed miniature tree, with good-sized acorns. The leaves of Brewer Oak are lobed like Garry Oak, but are much smaller—1½ to 3½ inches long—while the stems or trunks are 2 to 4 inches in diameter, gray in color. After the leaves drop

in the late fall a hill slope of Brewer Oaks looks all gray, like a mist on the mountain.

The principal **Scrub Oak** of the southern part of the State has the specific name of "*dumosa*." It is seldom over 8 feet high and has a great variety of leaf forms, sometimes producing on the same plant leaves with smooth edges, leaves twisted at the edges and set with "prickers," and leaves deeply lobed. The general effect, however, is of pricker-edged leaves. Try to force your way through a Dumosa Scrub Oak and you will indorse this statement. The oval acorns, from ¾ to 1⅛ inches in length, are set in shallow saucers rather than in cups; these saucers look as if they had been quilted. In size and shape the acorns vary almost as much as the leaves. The leaves of one season stay until the next spring's growth pushes them off.

Away up in the northwestern corner of the State, and extending into southwestern Oregon, is a most interesting scrub oak, the **Sadler Oak.** Occasionally reaching a height of 8 feet, it is more often under 3 feet in height, but has surprisingly large leaves for such a small oak. These leaves, 3 to 4 inches long, are heavily veined on the under side, the veins ending like prickles that beset the edges of the leaves. The leaf stems, one-half inch or more long, are positively furry with rust-colored hairs.

In addition to these three distinct sorts of scrub oak there are varieties of the taller oaks. The **Huckleberry Oak,** for instance, is a variety of the Canyon Live Oak, and looks like an exquisite miniature of its big brother. The Canyon Live Oak itself forms round green shrubs that cling to the sides of such canyons as the Yosemite and Kings River, and the Interior Live Oak, at 3,000 to 4,000 feet, on dry exposures, is the scrubbiest kind of a scrub oak. Once one's eyes are opened to the brush, it is delightful to come across a thicket or a single specimen of tough-twigged scrub that has acorns on it.

THE WILLOWS

In spite of California town camps, forest camps, and park camps to which pure water is piped, we enjoy camping by stream sides best of all. Here we have a chance to get acquainted with many sorts of water-loving trees, among them the nine species of willows, one of which is the very same Black Willow found in the Eastern States.

Perhaps the "Weeping Willow" is the mind-picture that comes to all of us; but that sort, though a favorite near the wells of our grandfathers, was planted there and is not native to America. Seven of the nine have the typical long-pointed narrow willow leaves, the other two—the **White Willow,** and the **Black Willow,** distinguished by their light or dark gray bark—have leaves broader in proportion to their length and rounded at the ends. All willows have at the foot of each leaf stem, and more strongly at the base of each shoot, a pair of odd little ear-shaped, leaflike growths that are sometimes dropped during the summer, but most often persist and help us to tell the willows from other trees. All the willows, too, have catkins (beginning before the leaves as "pussy willows") for blossoms, and all have quinine-bitter bark. If you want to be perfectly sure a tree is a willow, cut off a tiny bit of the bark and taste it. None of the California tree barks is at all poisonous, and unless you are careless enough to have cut into the shrubby poison oak you will have had only an experience.

The willows are seldom over 50 feet high, and more often are from 20 to 40; the mountain sorts are still smaller and divided into many stems.

Even well-trained botanists, with all material at hand and a good glass, sometimes have difficulty in distinguishing one species of willow from another. It is enough for the rest of us to know that a willow is a willow and to enjoy its beauty and shade from the "pussies" of spring to the lemon-yellow foliage of fall.

THE POPLARS

There are three sorts of these water-loving trees in California—the Aspen of the mountains, the Black Cottonwood of the foothill canyons, and the Fremont Cottonwood of the lower valleys. All have heart-shaped leaves that turn yellow in the fall; their bloom is a pendant catkin—or rather two catkins—one bearing the pollen dust on the male tree, the other eventually producing the "cotton" on the female tree. The poplars and the willows grow under similar conditions and are often found together.

Most of us are lucky enough to know the little **Aspen**—the "Quaking Asp"—for it grows in Alaska, Canada, the Eastern United States as far south as Missouri, the Western States, and Mexico, at elevations varying from sea level to over 10,000 feet.

It is the tree whose small heart-shaped leaves dance at the slightest breeze. A group at the other end of a meadow or a whole hillside of them, golden yellow in the fall, with a leaf here and there floating away on the wind, is a never-to-be-forgotten sight.

The **"Black Cottonwood,"** the largest "popple" in California, is found at elevations from 3,000 to 6,000 feet, abundantly in the Sierras, less frequently in the Coast Ranges. The leaves are longer pointed than our other two species—deep, shining green above, whitish below—and the bark is much darker and heavily ridged. It is largest in the rich flats in its lower elevations, sometimes being 125 feet high and 6 feet through, and is smaller as the elevation increases. At its best this tree furnishes real lumber, tough and pliant, odorless and tasteless, hence good for barrel staves, butter firkins, candy baskets, and such wares.

The **Fremont Cottonwood** is the common cottonwood of the lower valley stream sides, found in plenty along the Sacramento and San Joaquin Rivers and their branches. Its bark is also ridged, but is light brown in color; sometimes, at 3,000 feet, it is silvery, and when bare suggests white birch stems. Even under the best conditions the tree seldom grows upright, but leans over. When old and hollow-hearted it sometimes fairly lies down along the river bank, though still sending up vigorous branches.

THE MAPLES

There is but one large maple on the Pacific coast, the **Broadleaf Maple,** sometimes called the Oregon Maple, but fortunately that is well distributed, being found from Alaska through British Columbia, Washington, Oregon, and California. Here in California it can be seen in the Coast Range valleys from one end of the State to the other, and in those of the Sierra Nevadas from the Oregon line down to the Sequoia National Park, with occasional groups or single specimens in the cross ranges. While it prefers moist, gravelly soil and attains its greatest size and beauty on the bottom lands in Oregon, fairly good specimens are also found on the ridges and hill slopes. The writer remembers noting 20 years ago, on the trail from Mill Valley to Tamalpais, that the forest floor for miles was carpeted with maple seedlings; a few weeks ago, climbing the trail from the Happy Isles to Vernal Falls in Yosemite Valley, he looked down on fine, vigorous maples.

Our western maple is not the glory of the fall that the eastern maples are, for the leaves are thicker and only an occasional tree turns golden yellow. But the spring foliage is fine and green, while the leaves attain a breadth of from 7 to 14 inches. The flower clusters, coming with the leaves, are yellow and attract the bees almost as much as those of the elms. The shape of the leaves is like the ordinary maple, or rather more like a grape leaf, not quite so sharply and deeply cut as the Sugar Maple.

There are two dwarf maples that come down into California from Oregon; one mainly in the Sierras, the other chiefly a Coast Range species. The Coast Range species, called **Vine Maple** because of its tendency to sprawl rather than stand upright, is hardly ever more than a shrub. It has foliage similar to and as gorgeous as a Japanese Maple, both in its rosy spring color and in its flaming scarlet, yellow, or rose of fall. It has not been reported farther south than Mendocino County.

The **Dwarf Maple** is much less brilliant, though becoming somewhat colored. Its leaves are like those of the Japanese Maples in shape, and it is a pretty thing, found at 3,000 to 6,000 feet elevation, along streams, not very abundantly.

The **Boxelder** is botanically of the same genus as the maple, and if one looked only at the seeds, which are distinctly maple "keys," there would be no doubt about it. But most of us nonbotanists judge a tree by its leaves, and the Boxelder leaf is three-parted instead of a single incut leaf. The tree haunts the stream bottoms, where one finds it with willows and sycamores. It is not large (20 to 50 feet high and 10 to 30 inches in diameter), but helps make the good green along the creeks.

None of our California maples make good lumber, nor even very good firewood. If their wood is ever used at all commercially, it will be as pulp wood. In Oregon and Washington, however, the Broadleaf Maple becomes a large tree and is cut for lumber and fuel.

THE ALDERS AND A BIRCH

When camping near a stream have you noticed a rather smooth-barked tree with round open head, its lower branches drooping, and the tips bearing odd clusters of tiny "cones"?

This is one of the alders, the two larger sorts being rather hard to distinguish. In both, the leaf veins are conspicuous for their straightness, the side veins running from the mid-vein straight to the edge of the 3-inch leaf, giving it the effect of a "permanent wave." The **Red Alder** has somewhat darker foliage than the **White Alder**, and smoother gray bark. White Alders, when large, are rather rough and scaly toward the base of their trunks.

While generally taller than the willows and maples, with which they associate along our streams, they are still medium-sized trees, seldom attaining a height of even 90 feet. Sometimes, growing close together and excluding other species, they form straight, clean stems bending at the top over the water.

F-50801

FIG. 11.—MOUNTAIN ALDER (ALNUS TENUIFOLIA)

The leaves do not color at all in the fall; indeed they drop while still green, leaving the tree bare for a long season. But the Alders, the earliest of all the stream-side trees to bloom, put out their pendant catkins, known as "tags," strung along a stem. The Sierra species, the **Mountain Alder** (fig. 11), would almost meet the description given above for the two that grow at lower elevations, except that it is only 6 to 25 feet in height, is more markedly and beautifully toothed, and has more reddish color on the early stems that hold the tags. The main value of this mountain alder is as protection for the headwaters of streams—unless it be a credit to this dwarf tree that it trains one's patience by catching and holding one's fishline.

Even higher up than the Mountain Alder, and over on the eastern slopes of the Sierras, is found our one California **Mountain Birch.** It is a real birch, with the little heart-shaped leaves and the shining "old copper colored bark," as Sudworth describes it, distinguishing it from other streamside growth. It is more often a mere shrub, but has been found as large as 30 feet high and 10 inches in diameter.

Like the alders, the seeds come in tiny "cones," but these fall to pieces when the seeds mature; and, anyhow, there is only one cone in a place instead of the branched twig holding several cones and persisting long after the opening bracts have let the alder seed fly out.

You can see this dainty little birch at the south end of Shasta Valley, in the canyons on the west side of Owens Valley, near Mono Lake, above Simpson Meadow in the Middle Fork of Kings, and also in Bubbs Creek Canyon.

THE DESERT PALM

In spite of the advertising on the Atlantic coast of "native California dates," in spite of the long-time experiments with date-bearing palms from Tulare south to Imperial, and of ornamental palms and palmettos in gardens all over the State, we are bound to acknowledge that our one native palm is the **Desert Palm** (fig. 12), the "Fan Palm," or Washington Palm. It is a beautiful, hardy thing. Its fruit is eaten by Indians (and who has a better right to the native fruits?), and it is said that generations ago the Indians of Palm Valley thatched their huts with the leaves. For most of us, however, it is an ornamental tree, seen where it is native in the canyons opening into the Colorado Desert of the southeastern part of the State—Palm Canyon, Lukens Canyon, "Thousand Palms Canyon," etc. In these canyons it reaches a height of from 20 to 75 feet. Under cultivation it may do better than this. On San Pedro Street in Los Angeles

are two great fan palms that must be 100 feet high; they are said to have been planted by the fathers 200 years ago. There is no need for a description of the Desert Palm, with its plaited fans of circular leaves, its thornlike leaf stems, and its dead-drooping-leaf-clothed trunks, "like a dirty apron tied over a silk gown," as

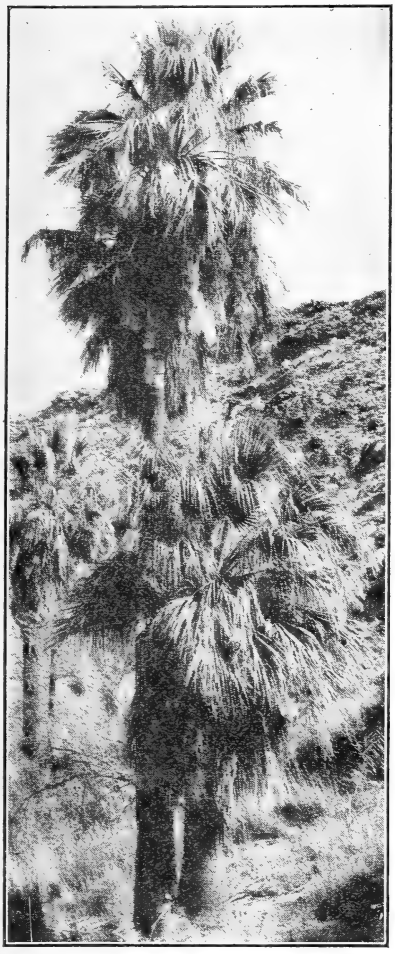

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FIG. 12.—DESERT PALM (NEOWASHINGTONIA FILIFERA)

some one aptly said. But everyone who can take the time should certainly manage a trip to Palm Canyon to see the tree in its native habitat.

THE MADROÑA

We Californians boast of having the biggest coniferous trees in the world, and of growing the biggest pumpkins—even of having the tallest and finest tarweed. But not all of us happen to know that we might also boast of the greatest heather. The "Madroña" is a heath; each white blossom of the great clusters one sees away up overhead is an urn, like the rest of the heather blooms, and what a great heath it is—20 to 125 feet high, with a trunk 6 inches to 5 feet in diameter!

While found only on the Pacific coast, it is not confined to California by any means, occurring in British Columbia, Washington, and Oregon as well. In California it grows as far south as the South Fork of the Tuolumne River in the Stanislaus National Forest, in the Sierra Nevadas; and in the Coast Range canyons as far south, though rarely, as San Bernardino County.

This beautiful evergreen tree, with smooth, terra-cotta colored bark (darker and rougher in the lower part of the trunk of old trees), and its deep-green 4 to 6 inch smooth-edged leaves, brilliantly glossy above and somewhat fuzzy underneath, is common in Santa Cruz County, in Sonoma, and in Mendocino. The Ukiah (Mendocino County) parks are full of it. The town camp ground has many wonderful specimens, and a large majority of the homes have one to half a dozen of these trees in their grounds, so that the town seems set in a grove of Madroñas, white and fragrant in blooming season and brilliant with round red berries in December or November. Each berry is about a third of an inch through and is rough like an orange, not smooth and glossy like the leaves of the tree or the berry of the California Holly.

THE CALIFORNIA WALNUT

The joy of the early comers to California in the fifties upon finding walnuts growing along the creeks, from the lower Sacramento clear south, soon gave way to disgust as the nut meats were found to be meager and the trees so small and limby as to render the wood almost useless for cabinet work. To this day it is used in its native habitat mainly as a soil holder or to furnish firewood, though nurserymen find that seedlings of the California Walnut form the finest disease-resistant stock on which to graft the soft-shell "English" sorts. It grows along many streams 20 to 40 miles from the coast and occasionally occurs in the Sierra foothills. In the coast canyons—along Walunt Creek in

Contra Costa County, for example—its rich green marks the course of the stream for long distances, the trees growing from 20 to 50 feet high.

The leaves are what are called "compound"—that is, they are formed of leaflets in pairs along a central axis or leaf stem, each leaflet looking like a complete leaf. The walnut leaves and the green bark of the small branchlets have a sharp pungent odor. The old bark of the main trunk is very dark and cut into deep ridges, while the newer bark of the main branches is gray. The bark is characteristic and aids one to identify the tree, although the little leaf scars in groups on the younger wood also help.

THE CALIFORNIA SYCAMORE

Along certain creeks in either coast or Sierra canyons, one finds the **California Sycamore** (fig. 13), white-barked and, except when growing in a deep canyon, sprawling lazily over the landscape. The wood is rather brittle and under weight of leaves or in heavy storms, branches break off, leaving the sturdy trunk to send out new sprouts. Then in the spring, on these new shoots and the branches that did not break come the large leaves suggestive of grape leaves, only cut slightly deeper. A fungous growth promptly attacks these first leaves, killing almost every one and forcing a second leaf crop. This forms a good shade, not too heavy, the joy of the camper because not as cold as a denser shade and yet not hot like th open. Children, too, love the Sycamores—"dandy climbers," as they call them. The bloom is different from that of any other tree, being an open cluster of three or more balls about three-quarters of an inch in diameter.

THE ASH

There is just one timber ash in California, commonly known as the **Oregon Ash**, though found from Puget Sound to San Bernardino, in both Coast Range and western Sierra canyons, along streams, and in the open. The leaves are compound, with five to seven yellow-green leaflets, fuzzy underneath. The two sorts of bloom (male and female) occur on separate trees, only one forming the hanging clusters of winged seeds.

Like the eastern ashes this tree forms in its rapid-growing new shoots a tough elastic timber, highly valued by woodworkers and once much sought for wagon tongues.

THE CALIFORNIA LAUREL

The **California Laurel**, a sharply-fragrant, broad-leaf evergreen tree, is found along streams in the coast hills from southern Oregon to Los Angeles and in canyons of the west slopes of the Sierras from Shasta to Tulare County. Where conditions are favorable, as on certain rich bottoms in Sonoma and Mendocino Counties, it makes a tree 60 to 80 feet high and 2 to 3 feet in diameter. On a sandy Sierra foothill slope it grows into a many-stemmed shrub 4 to 10 feet high.

F-51147

FIG. 13.—CALIFORNIA SYCAMORE (PLATANUS RACEMOSA)

In either case the leaves are a rich, shining green from 3 to 6 inches long and from one-third to 1½ inches wide. Dried, these form a perfectly good substitute for the bay leaves of the French cooks, giving an indescribable flavor to soups, stews, and pot roasts but not to be left in pot or kettle more than five minutes, it is advised.

The seed is a solitary nut, or a cluster of two or more, with a pale-green skin that eventually turns black and in both stages suggests an olive. But don't follow the suggestion and

try to eat it. The wood is much the most beautiful of our native woods and is used commercially, though to a limited extent, as the species occurs only in scattered growth. Because of its lovely red-brown, heavy hardwood, California Laurel is well worth preserving and planting. In the northern coast counties it is known as "Pepper Wood."

THE BUCKEYE

The **Buckeye** has been left until the last of the trees, as the writer is uncertain whether to group it with trees or with those other ornamental treelike shrubs—the Dogwood, the Fremontia, and the larger Manzanitas. However, the best Buckeyes outgrow all these others, so it should probably be put with the trees.

The Buckeye is the first tree in the Sierra foothills to put out new green in the spring, the vivid 5-fingered leaves shining against the white stems, and followed by the glorious upright spikes of fragrant bloom. Usually from 10 to 20 feet high and 3 to 6 inches in diameter, it occasionally reaches a height of 30 feet and a diameter of 20 inches.

In the fall the Buckeye leaves are the first to turn—a soft woods brown—and then drop before other trees are ready to lose their leaves. What remains is the gray trunk and whitish branches or the many white stems of a shrub, from which hang the pear-shaped, gray-green fruit. Shortly the green outer husk splits and the glossy brown eye looks out. Then in a few days the ripened fruit falls. This seed, the buckeye, is a thing of beauty, but don't take it home. It will be dull and shriveled very soon, and besides the youngsters will be sure to try to eat it. No; it isn't poisonous; it is liable, however, to produce nausea and is sure to leave a most unpleasant sting in mouth and throat, because it contains so much "saponin"—essence of soap, as one might say.

The Buckeye, either as tree or bush, is found almost anywhere in the western foothills of the Sierras, from Mount Shasta to the Santa Barbara Mountains, and in the Coast Ranges.

INDEX OF COMMON AND SCIENTIFIC NAMES

"A town without trees is cheerless,
A country without trees is hopeless."

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